

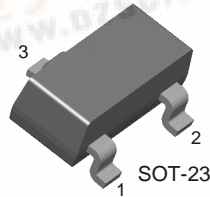


February 2005

# MMBT3904K

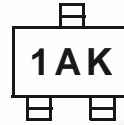
## NPN Epitaxial Silicon Transistor

### General Purpose Transistor



1. Base 2. Emitter 3. Collector

Marking



### Absolute Maximum Ratings T<sub>a</sub> = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V <sub>CBO</sub>	Collector-Base Voltage	60	V
V <sub>CEO</sub>	Collector-Emitter Voltage	40	V
V <sub>EBO</sub>	Emitter-Base Voltage	6	V
I <sub>C</sub>	Collector Current	200	mA
P <sub>C</sub>	Collector Power Dissipation	350	mW
T <sub>STG</sub>	Storage Temperature	150	°C

### Electrical Characteristics T<sub>a</sub> = 25°C unless otherwise noted

Symbol	Parameter	Test Condition	Min.	Max.	Units
BV <sub>CBO</sub>	Collector-Base Breakdown Voltage	I <sub>C</sub> = 10μA, I <sub>E</sub> = 0	60		V
BV <sub>CEO</sub>	Collector-Emitter Breakdown Voltage *	I <sub>C</sub> = 1mA, I <sub>B</sub> = 0	40		V
BV <sub>EBO</sub>	Emitter-Base Breakdown Voltage	I <sub>E</sub> = 10μA, I <sub>C</sub> = 0	6		V
I <sub>CEX</sub>	Collector Cut-off Current	V <sub>CE</sub> = 30V, V <sub>EB</sub> = 3V		50	nA
h <sub>FE</sub>	DC Current Gain *	V <sub>CE</sub> = 1V, I <sub>C</sub> = 0.1mA V <sub>CE</sub> = 1V, I <sub>C</sub> = 1mA V <sub>CE</sub> = 1V, I <sub>C</sub> = 10mA V <sub>CE</sub> = 1V, I <sub>C</sub> = 50mA V <sub>CE</sub> = 1V, I <sub>C</sub> = 100mA	40 70 100 60 30	300	
V <sub>CE(sat)</sub>	Collector-Emitter Saturation Voltage *	I <sub>C</sub> = 10mA, I <sub>B</sub> = 1mA I <sub>C</sub> = 50mA, I <sub>B</sub> = 5mA		0.2 0.3	V V
V <sub>BE(sat)</sub>	Base-Emitter Saturation Voltage *	I <sub>C</sub> = 10mA, I <sub>B</sub> = 1mA I <sub>C</sub> = 50mA, I <sub>B</sub> = 5mA	0.65	0.85 0.95	V V
C <sub>ob</sub>	Output Capacitance	V <sub>CB</sub> = 5V, I <sub>E</sub> = 0, f = 1MHz		4	pF
f <sub>T</sub>	Current Gain-Bandwidth Product	V <sub>CE</sub> = 20V, I <sub>C</sub> = 10mA, f = 100MHz	300		MHz
NF	Noise Figure	I <sub>C</sub> = 100μA, V <sub>CE</sub> = 5V, R <sub>S</sub> = 1KΩ f = 10Hz to 15.7KHz		5	dB
t <sub>ON</sub>	Turn On Time	V <sub>CC</sub> = 3V, V <sub>BE</sub> = 0.5V I <sub>C</sub> = 10mA, I <sub>B1</sub> = 1mA		70	ns
t <sub>OFF</sub>	Turn Off Time	V <sub>CC</sub> = 3V, I <sub>C</sub> = 10mA, I <sub>B1</sub> = I <sub>B2</sub> = 1mA		250	ns

Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%

MMBT3904K NPN Epitaxial Silicon Transistor



Typical Performance Characteristics

Figure 1. DC current Gain

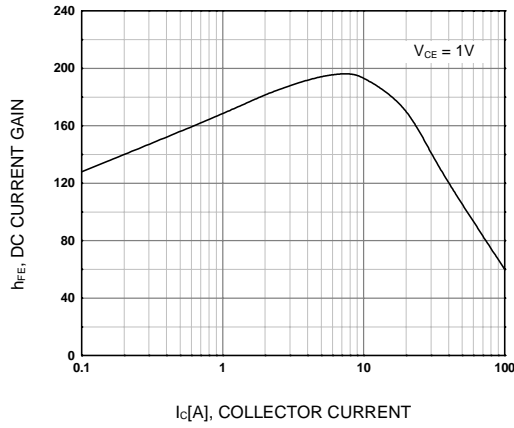


Figure 2. Base-Emitter Saturation Voltage  
Collector-Emitter Saturation Voltage

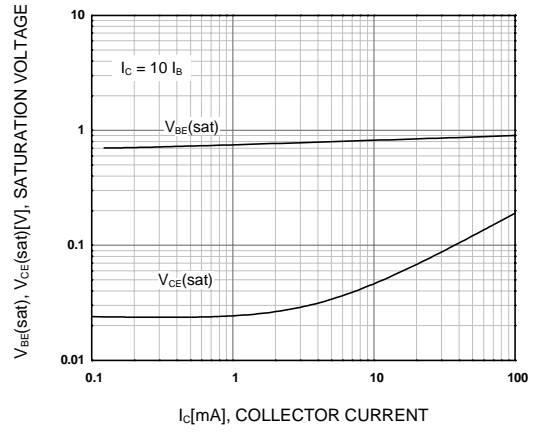


Figure 3. Output Capacitance

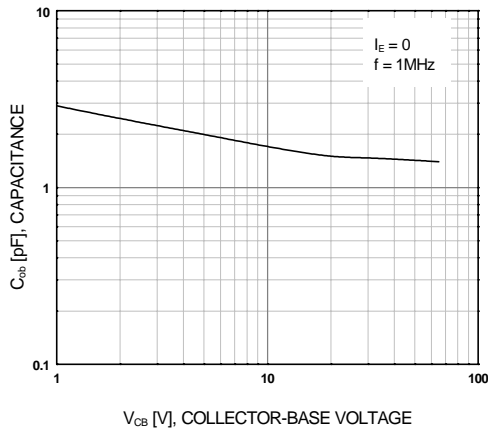
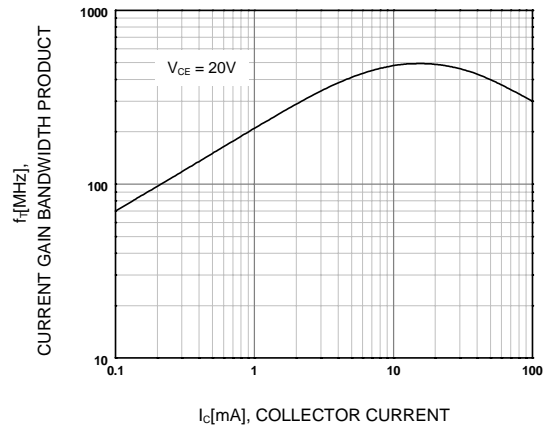
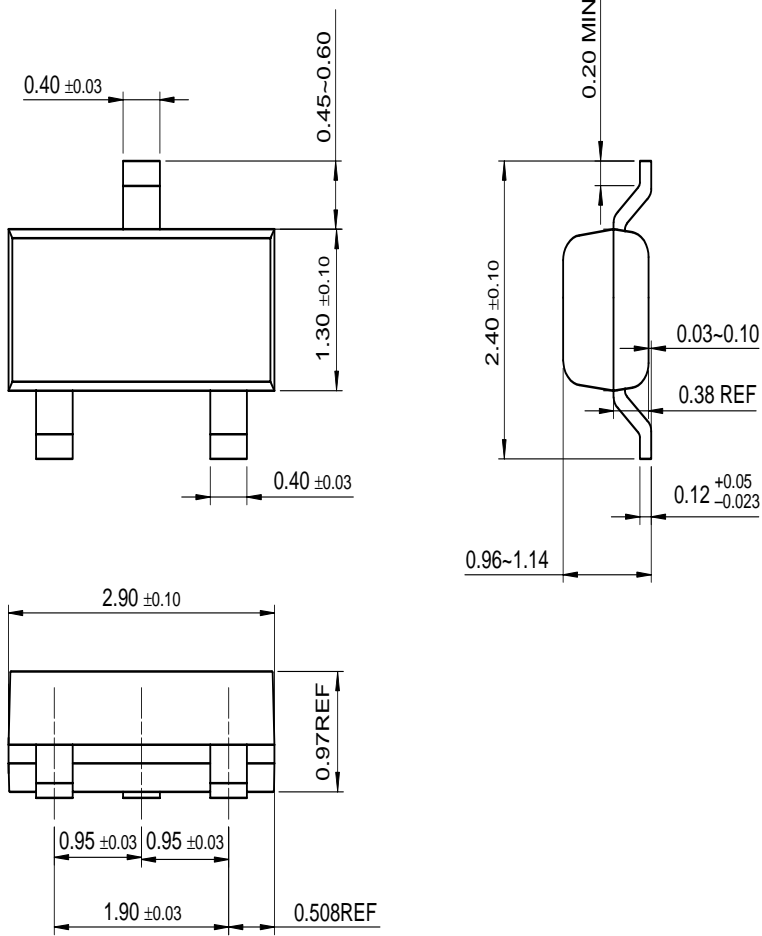


Figure 4. Current Gain Bandwidth Product



Mechanical Dimensions

SOT-23



Dimensions in Millimeters



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